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NATURAL FLOWER PRESERVING PROCESS

TECHNICAL SECTOR

The present invention relates with a process for obtaining flowers having the appearance and texture like fresh flowers. The flowers obtained using the process of the present invention last longer as they are not impaired by microorganisms since water contained in cells has been replaced by other substance(s) thus inhibiting microorganism growth.

INVENTION BACKGROUND

Several different methods are presently known to preserve flowers for a long time period, such as those claimed in US Patent No. 5.252.537 of October 12, 1993, titled "Long-lasting cut flowers and treatment method to obtain them", filed in the name of Sarl Compagnie Du Nord, Inventor Nadine De Winter-Scailteur.

Such US Patent divulges a method consisting of replacing the water in the flower tissue by substances inhibiting microorganisms growth. The treatment comprises a dehydration step in which water is drawn out by using an anhydrous solvent, and then is progressively absorbed into the pores of a molecular sieve. Next the solvent is replaced by a mixture of polyethylene glycol, colorants, and the same solvent used in the first step. Finally, the flowers are drained and dried. This procedure gives rise to a product failing to show smoothness and durability required by market users. Additionally, anhydrous solvents used by said method are toxic, thus causing a highly negative environment impact.

SUMMARY OF INVENTION

This invention involves the steps below:

a) Selecting and cutting (1);
b) Assembling of the supporting devices and grids (2);
c) First Dehydration (3a);
d) Second Dehydration (3b);
e) Third Dehydration (3c);
f) Optionally repeating consecutive steps of dehydration (3c)
g) Infiltration (4); and
h) Evaporation (5).

a) Selecting and Cutting (1)

This step comprises selecting flowers which are in the proper opening stage and hydrating them to ensure a turgid opening. This opening stage will last between 6 to 72 h, depending on the type of flower and its maturity stage when the cut is made.

Once the flowers have reached its optimal opening level, they are separated from the stems by cutting at a distance from and depending on the flower itself.

b) Assembling of the supporting devices and grids (2)

The flowers are spiked in the sharpen tips (12) of the grid's (7) spirals (11) and such grids are assembled in the central axle (9) of the supporting device (8), as shown in Figures 1 and 2.

The grids (7) are assembled on the central axle (9) of the supporting device (8), one on top of the previous one, with separators (13) in between, with enough distance apart so that flowers are not crushed, and which size depends on the height required for each type of flower to be processed.

c) First Dehydration (3a)

The supporting device (8) is introduced into the reactor (14). The reactor (14) is filled out until the solvent completely covers the flowers and is held at a temperature ranging between room temperature and 100° C, for at least 30 min. Then, the solvent is drawn out from the reactor (14) and recovered.

d) Second Dehydration (3b)

An ethanol-water mixture is poured into the reactor (14) having no less than 80% alcohol, previously heated at 65°C. The reactor (14) is filled out until the solvent completely covers the flowers and is maintained at a temperature no less than 65°C for at least 30 min. Then, the solvent is drawn out from the reactor (14) and next, it is recovered.

e) Third Dehydration (3c)

A solvent comprising ethanol with an alcohol content of no less than 90%, preheated at least at 65°C is introduced into the reactor (14). The reactor (14) is filled out until the solvent has completely covered the flowers and then is maintained at a temperature no less than 65°C for at least 30 min. Next, the solvent is drawn out from the reactor (14).

f) Optionally, step (3c) may be successively be repeated but increasing alcohol content of the solvent in each step.

g) Infiltration (4)

The flowers are introduced and completely immersed into a bath comprised of a polyethylene glycol, ethanol and colorants mixture. The reactor is then pressurized and heated until reaching a temperature between 65°C ant 100°C. After some treatment time, the mixture is transferred to a storing tank.

h) Evaporation (5)

The reactor (14) is subjected to vacuum between 50 kPa and 68 kPa during around 60 min. Then, the vacuum is interrupted, the reactor (14) is opened, and the supporting device 8 and grids 7 are taken out along with the flowers.

The flowers may be subjected, within the reactor, to a drying process with a hot air stream in order to completely evaporate the solvent.

The process of the present invention has several advantages compared to the current nearest state-of-the-art, US 5.2522.357. The process of this invention is faster than the process described in the document US 5.252.537, requiring between 6 and 18 h for the flower to be dried. The present invention uses as a dehydrating means ethyl alcohol, which is far less toxic than the solvents used in the state of the art methods. The present invention recovers, through the use of traditional methods and means, the used solvent up to a purity level that allows it to be re-utilized. The present invention does not require the use of molecular sieves during the process. The flowers obtained by the process of the present invention show a smoother texture than those obtained using the nearest state-of-the-art process. Finally, the process of the present invention is more technically advanced, allowing working at an industrial scale.

LIST OF ENCLOSED FIGURES

Figure 1 shows a perspective view of the grid (7),

Figure 2 is a top view of grid (7) of figure 1,

Figure 3 is a cross-section view of the supporting device (9) and grids (7), and

Figure 4 is a block diagram of the process for preserving flowers according to the invention.

DESCRIPTION OF THE INVENTION

The present invention comprises a process for obtaining long-lasting flowers having an appearance and texture of a fresh live flower. The process of this invention is characterized by the following steps:

a) Selecting and Cutting (1);

b) Assembling of the supporting devices and grids (2);

c) First Dehydration (3a);

d) Second Dehydration (3b)

e) Third Dehydration (3c);

f) Optionally, repeating successive steps of dehydration (3c)

g) Infiltration (4);

h) Evaporation (5).

The above-mentioned steps are described below:

a) Selecting and Cutting (1)

This step consists in selecting the flowers which are already in its proper opening stage; the stems are immersed into water, so as to let them obtain a hydration level that guaranties a turgid appearance and an opening degree that shows the flower in its most attractive form, without the risk of having the petals be detached due to an excessive opening of the flower.

It must be taken into account that the opening period of the flower must be as short as possible in order to avoid losses due to fungus attack, petal falling and in general, impairment of the flower appearance. Also, a careful handling of the flowers in all the previous steps is highly desirable in order to guarantee the preservation of all petals throughout the process and thus result in a splendid flower.

This opening stage can last between 6 and 72 h, depending on the type of flower and its maturity when the cutting is made.

Once the flowers have reached its optimal opening, the stems are cut away at a distance that depends on the type of flower being processed. For example, in the of roses and carnations, the distance for the cut will range between 1 cm and 2 cm; when dealing with hydrangea, distance

will vary between 10 cm and 15 cm. The flowers may or not be fixed to a device to continue with the process.

b) Assembling of the supporting devices and grids (2);

The flowers are fixed on the sharp tips (12) of the spirals (11) of the grids (7), and said grids are assembled in the central axle (9) of the supporting device (8) as shown in Figures 1 and 2.

The supporting device (8) comprises the grids (7), the base of which comprises channels (10) that allow for draining off liquid to the outside part of the grids (7). On such a metal channels (10), inverted frustoconical stainless steel spirals (11) have been welded, resembling the shape of the flower and which in its bottom base the wire has been perpendicularly bent and ends up in a sharp tip (12) wherein the flower stem is fixed on.

In a preferred embodiment, the grids (7) have a circular shape.
In further preferred embodiment, the grids (7) have a diameter of 64 cm.
In a preferred embodiment, the spirals (11) are made of stainless steel.

The spirals (11) allow the sepals of the flower to be in an upward position, attached to the petals, which help them to be held in position and preventing from detachment during process.

The circular grids (7) are assembled in the central axle (9) of the supporting device (8), one on top of the previous one, with tubular separators (13) placed in between enough distance apart so that the flowers are not crushed and which dimension depends on the height required for each type of flower being processed. In a preferred embodiment addressed to roses, each grid (7) has a capacity to accept 90 to 110 flowers.

The supporting device (8) accepts 1 or more grids (7) in it. In a preferred embodiment, the supporting device (8) accepts from 10 to 12 grids (7).

c) First Dehydration (3a);
The supporting device (8), once filled out with flowers, is placed into the reactor (14). In a preferred embodiment, the supporting device (8) is hung in a rail of an elevated conveyor device

that permits to place it on top and then lower it down inside a reactor (14) where dehydration will be carried out.

In a preferred embodiment, the cylindrical reactor is made out of stainless steel, and can be operated up to 138 kPa pressure, or empty up to 77 kPa and at temperatures up to 200°C.

A mixture (16) of any solvent miscible in water, and water with a solvent content no less than 70% and temperature between room temperature and 100°C is passed from a feeder tank (15), and for such a purpose, pressurized air is introduced into the feeder tank (15) and valves communicating the tank (15) with the reactor (14) are opened. The reactor (14) is filled out until solvent has completely covered the flowers maintaining the temperature ranging between room temperature and 100°C, during at least 30 min. After such time, the solvent, which has already extracted part of the water contained in the flowers, is removed from the reactor (14) and passed on another tank for its subsequent recovery through well known methods, such as distillation.

d) Second Dehydration (3b)

Upon the completion of the first dehydration stage, a mixture of any solvent miscible in water and water with a content of solvent no less than 80% and at temperature between room and 100°C is introduced into the reactor (14). In a preferred embodiment the temperature is held at 65°C. The reactor (14) is filled out until the solvent has completely covered the flowers and is maintained at a temperature room and 100°C, for at least 30 min. In a preferred embodiment, the temperature is held at 65°C. After such time, the solvent that has extracted other portion of water contained in the flowers is withdrawn out from reactor (14) and passed on to another tank for its subsequent use or recovery through well known methods, such as distillation.

e) Third Dehydration (3c)

After the second dehydration step, a mixture of any solvent miscible in water and water with a solvent content no less than 90% and a temperature between room and 100°C is introduced into the reactor (14). In a preferred embodiment the temperature is held at 65°C. The reactor (14) is filled out until the solvent has completely covered the flowers and is then maintained at a temperature between room and 100°C for at least 30 min. After this time, virtually all of the water initially contained in the flowers has been replaced by an alcoholic solvent, with dehydration causing no change in the flowers shape, as its structure remains intact. The solvent is then withdrawn from the reactor ((14) and stored in another tank for a future use.

f) Optionally, step (3c) may be repeated successively but with a solvent content increase in each additional step.

The solvent used in the dehydration steps is preferably an alcohol, and even more preferably, ethanol.

g) Infiltration (4)

Upon the completion of the third dehydration step (3c), the flowers are introduced and immersed into a bath consisting of a mixture of colorants, solvent and a soluble polymer. Preferably, the polymer is polyethylene glycol, and even more preferably is polyethylene glycol 400. The reactor is heated until reaching a temperature between room and 100° C, preferably 65°C. After some time of treatment ranging between 2 and 72 h, all the solvent initially filling flower tissue, has been replaced by the mixture containing polyethylene glycol and colorants. Then, such mixture is transferred to a storing tank.

The polymer percentage in the mixture is determined according to the type of flower to be treated and the consistence or texture of the flower to be desirably obtained.

The colorants used in the present invention are of the type used in food industry, provided that they are soluble in the mixture and easily diffusible and fixable on the cellulosic tissue of the flower. Also, adequate colorants are those usually used in textile industry.

The mixtures used usually vary from a polymer percentage between 20% and 55% and an alcoholic solvent percentage from 45% to 80%.

Process time during this step goes from 12 to 72 h at room temperature, although it may be reduced from 2 to 12 h when operating with temperatures up to 100°C.

g) Evaporation (5)

After removing the mixture, the reactor (14) is subjected to vacuum during around 60 min, enough time to allow the evaporation of the majority of the solvent. Then, the vacuum is interrupted, the reactor (14) is opened and the supporting device (8) and the grids (7) are taken out along with the flowers using an elevated conveyor system.

The intracellular spaces of the flower are now filled with the mixture of polymers. Now, the flowers can be subjected, into the reactor, to a drying step using a hot air stream in order to completely evaporate the remaining solvent.

Drying may be made also by passing the supporting device (8) and the grids (7) along with flowers through a tunnel where hot air circulates.

It shall be understood that the above description is merely illustrative according to requirements of a sufficient disclosure and by no means limits the scope of the invention, which is defined only by the claims given below.

LIST OF REFERENCE SIGNS USED

1. Selecting and cutting
2. Assembling of the supporting device and grids
3 Dehydration
4. Infiltration
5. Evaporation
6. Packing
7. Grids
8. Supporting device
9. Central axle of supporting device
10. Channels of the grids
11. Spirals
12. Sharp tip
13. Tubular separators
14. Reactor
15. Feeder tank
16. Mix of solvents